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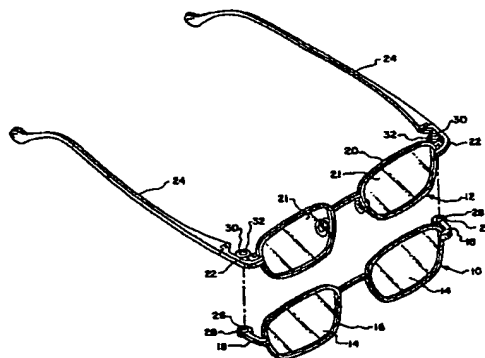
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(54) Title: AUXILIARY EYEWEAR ATTACHMENT METHODS AND APPARATUS AND UNIVERSAL ADAPTER



(57) Abstract: A method and apparatus for mounting auxiliary eyeglasses (10) on conventional eyeglasses (12) in which magnets are attached to appendages (18) on the auxiliary eyeglasses mating with magnets mounted on the temple extensions (22) of conventional eyeglasses. The magnets (26) on the auxiliary eyeglasses are mounted in sockets (28) formed on the appendages (18) of the auxiliary eyeglasses such that their maximum magnetic force is oriented vertically or parallel to the plane of the conventional eyeglass frame. The appendages (18) on the auxiliary eyeglass frame (16) fit beneath the temple extensions (22) on the conventional eyeglass frame (20) to hold the auxiliary frames in place solely by the magnetic attractive force. The orientation of the magnets is such that the maximum magnetic force resists any downward movement of the auxiliary eyeglasses (10) on the conventional eyeglasses (12) when installed. In a modification of the embodiment, the magnets mounted on the appendages extend out of the sockets. The extended magnets fit into the recesses in the conventional eyeglass sockets automatically aligning and securing the auxiliary eyeglasses on the conventional eyeglasses. Another embodiment is comprised of a universal adapter (80) in which a magnet is mounted in a cylindrical sockets (82) and has a tongue (84) with a hole (86) for mounting on conventional eyeglasses with existing hardware.

SPECIFICATION

TITLE: AUXILIARY EYEWEAR ATTACHMENT METHODS AND APPARATUS
AND UNIVERSAL ADAPTER

This application is a Continuation-In-Part application of Prior Application Serial No. 09/184,694, filed November 2, 1998.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to auxiliary eyewear attachment methods and apparatus, such as clip-on eyewear, and more particular relates to an auxiliary eye wear for attaching auxiliary sunglasses to conventional eyeglasses.

2. Background Information

Auxiliary eyewear to convert conventional eyeglasses to sunglasses are very popular. They allow the user to usually avoid the need for two separate prescription lenses. They can also be used, but less frequently, to attach auxiliary eyewear that can change the prescription of lenses. The more common use, however, is to add tinted lenses to conventional eyeglasses.

A number of different designs are available for auxiliary eyewear including clip-on eyewear, as well as auxiliary eyewear attachment using magnets. One method of attaching auxiliary eyewear is by clips. A method of attaching auxiliary eyewear by clips is shown and described in U.S. Application No. 08/510,797 filed August 3, 1995 to the same inventor as the invention disclosed herein and incorporated herein by reference. Another patent describing

a clip-on type of sunglasses is disclosed and described in U.S. Patent No. 5,696,571 issued December 9, 1997 to Spencer et al. In these devices auxiliary eyewear is fastened to eyeglasses by a conventional clip system with one clipping engaging the temple while other clips engage the conventional frame.

A newer and very popular method of attaching eyeglasses is by using magnets. One such method is disclosed and described in U.S. Patent No. 4,070,105 of Meeker. In the Meeker patent the conventional frame includes a magnetic material secured around the peripheral portion facilitating attachment of auxiliary eyeglasses to the conventional eyeglass frame.

Another method of attaching auxiliary eyeglasses using magnets is disclosed in U.S. Patent No. 5,416,537 of Sadler having magnets secured to temporal portions of a conventional frame that mate with similar magnets in auxiliary eyeglass frames. In the Meeker and Sadler patents the magnets are embedded in portions of the frames in a vertical orientation for mating with similar magnets in the auxiliary eyeglasses. A problem with this type of arrangement is that the auxiliary eyeglasses are held in place in front of the conventional eyeglasses only by the strength of the magnets. There are no supporting members to prevent the auxiliary eyeglasses from moving vertically relative to the conventional eyeglass frame. Therefore, when the auxiliary eyeglasses are used in some strenuous

activity such as jogging or exercising they can slide off and become detached from the conventional frame.

A design that solves this problem by having magnets in auxiliary eyeglass extensions is disclosed and described in U.S. Patent No. 5,568,207 of Chao. In this patent the problem of the eyeglasses sliding vertically and coming off the conventional eyeglasses is solved by extensions on the auxiliary eyeglasses having magnets that extend over (i.e. above) hinge connections for the temples of the conventional eyeglasses. Magnets in the hinge connections mate with magnets in the extensions to hold the utility eyeglasses in place in front of the conventional eyeglasses. The extensions fitting over (i.e. above) the hinge portions of the conventional eyeglasses prevent the frames from moving downward. It was thought that this combination of the extension being above the temple connection in combination with the magnet prevents the auxiliary eyeglasses from moving downward relative to the conventional eyeglasses and being dislodged during strenuous activity. That is, the patent describes the prior art as being unable to provide a practical solution to attaching auxiliary eyeglasses to conventional eyeglasses with magnets alone.

The problem with the eyeglasses disclosed and described in U.S. Patent No. 5,568,207 is that the auxiliary eyeglass extensions must be carefully placed above the temple hinge connections. This makes it little more difficult to attach the auxiliary frames to be sure that the extensions are placed carefully above the hinge connections of the

conventional eyeglass. In most cases a wearer has to remove his conventional eyeglasses to attach the auxiliary lenses.

It is, therefore, one object of the present invention to provide an improved method and apparatus for attaching auxiliary eyeglasses to conventional eyeglasses.

Another object of the present invention is to provide an improved method and apparatus for attaching auxiliary eyeglasses to conventional eyeglasses with magnets alone without any need for other support.

Yet another object of the present invention is to provide a method of attaching auxiliary eyeglasses to conventional eyeglasses by appendages having magnets which fit below and mate with similar magnets in the conventional eyeglass extensions for attaching eyeglass temples.

Still another object of the present invention is to provide an improved magnetic attachment of auxiliary eyeglasses to conventional eyeglasses with magnets that are oriented to maximize the magnetic force to prevent vertical or downward movement of the auxiliary eyeglasses.

Still another object of the present invention is to provide an auxiliary eyeglass magnetic connection having magnets that are oriented horizontally to maximize the magnetic force in the vertical direction.

Still another object of the present invention is to provide an auxiliary eyeglass magnetic attachment that includes additional supporting clips, if desired.

Yet another object of the present invention is to

provide auxiliary eyeglass magnetic attachment that includes a clip that conveniently fits over the bridge of conventional eyeglass frame.

BRIEF DESCRIPTION OF THE INVENTION

The purpose of the present invention is to provide an improved auxiliary eyeglass attachment method and apparatus that has a secure attachment by use of magnets that effectively prevents the auxiliary eyeglasses from becoming detached from the conventional eyeglass without a need for additional support.

In the preferred embodiment of the invention the auxiliary eyeglasses are attached to conventional eyeglasses by magnets in a manner that prevents any downward or vertical movement that might cause the auxiliary eyeglasses to become detached. The method of attaching with magnets disclosed herein also provides a much easier method of securing the auxiliary glasses to the conventional eyeglasses as will be described in greater detail hereinafter.

It was thought, for example, as disclosed in the patent of Chao, Patent No. 5,568,207, that some support was needed to prevent the auxiliary eyeglasses from "moving downward" and coming off the conventional eyeglasses. However, what was not recognized was that magnets have a very strong attraction in a direction perpendicular to their axis. That is, with very strong magnets it is difficult to separate them by pulling them straight apart. Usually to separate them, particularly when they are very strong magnets, is by

sliding them in a direction parallel to their mating surfaces. The reason for this is that the magnetic force is stronger in a direction perpendicular to the surface (i.e. the poles) of the magnets than it is to a direction parallel to the surface. The inventor of the auxiliary eyeglasses disclosed herein discovered that because of this principle correctly oriented magnets can securely hold auxiliary eyeglasses on conventional frames without the need for additional support. The key is to orient the magnets so that any vertical force applied to the auxiliary frames will be perpendicular to the plane of the magnets.

To achieve this unique construction of appendages on opposite sides of the auxiliary frames including a socket for receiving magnets that are oriented with the plane of the magnets horizontal and the axis (i.e. poles) vertical or parallel to the auxiliary eyeglass frame. Complementary mating magnets are mounted in sockets on the hinge extensions on the conventional eyeglasses which are also oriented with the plane of the magnets horizontal and their axis (i.e. poles) vertical or approximately parallel to the plane of the conventional eyeglass.

This arrangement means the auxiliary eyeglasses may be easily mounted on the conventional eyeglasses without any fumbling or searching. The user doesn't have to feel with your fingers or remove the eyeglasses to be sure that the auxiliary eyeglass appendages are carefully aligned over the temple mounting extensions as with the arrangement described

in U.S. Patent No. 5,568,207 referred to hereinabove. You simply place the auxiliary eyeglasses against the conventional eyeglasses with a slight upward motion and they easily attach when the magnets come into close proximity. This arrangement makes for a securely attached auxiliary eyeglasses and frame that is simple and easy to use without the difficulties with the other auxiliary eyeglass designs.

One can easily see the auxiliary eyeglasses approaching the conventional eyeglasses with the appendages on the auxiliary eyeglasses below the temple of the conventional eyeglass frame. Then with a very slight upward movement the magnets attract and the auxiliary eyeglass frame is firmly attached. This can be done simply and easily with one hand without any feeling or fumbling that previous arrangements required. The orientation is nearly automatic and doesn't require the more careful alignment that is required of other magnetically fastened auxiliary eyeglasses.

An optional but preferred embodiment of the invention includes modification of the sockets for receiving the magnets that are mounted in the appendages in opposite sides of the utility frames and in complementary sockets on temple extensions on the conventional eyeglasses. In this embodiment the magnets in the sockets on either the auxiliary frames or the temple extensions on the conventional eyeglasses are recessed while the magnets in the opposite sockets are slightly extended or raised. This provides a distinct and improved advantage in mating the magnets on the auxiliary frames with the magnets on the

temple extensions of the conventional eyeglasses.

The unique and distinct advantage of the invention is the avoidance of scratching the lenses with the appendages for holding the magnet sockets. The reason for this is that the auxiliary eyeglasses are mounted from below. With the recessed sockets a more firm attachment is achieved and alignment of the auxiliary eyeglass frames on the conventional eyeglass frames is almost automatic. One need only press the auxiliary eyeglass lenses against the conventional eyeglass lenses and with a slight upward movement, the raised magnets on one side almost automatically slip into and seat in the recess in the complementary socket. The raised and recessed magnets provide automatic alignment and additional support against horizontal movement of the auxiliary eyeglass.

Another optional but preferred embodiment of the invention includes the use of a universal adapter to mount magnets on conventional eyeglass frames utilizing existing hardware and components. This embodiment provides a universal adapter for attaching magnets to conventional eyeglasses. The embodiments described previously have permanently attached magnets requiring specially constructed eyeglass frames. The previous embodiments have sockets with magnets permanently attached to temple extensions for mating with matching magnets on auxiliary eyeglass frames. This embodiment includes a socket with magnets having a tongue with a hole for mounting the socket on conventional eyeglass

frames using existing hardware.

In one configuration the socket is attached to a tongue for securing to existing eyeglass frames by a screw passing through the hole of the tongue threaded into the existing threaded hole for mounting the temples on conventional eyeglass frames. The socket holds a magnet constructed to mate with magnets on appendages attached to auxiliary eyeglass frames.

A second configuration includes a socket having a tongue with a hole for mounting the universal adapter socket on the conventional frames by utilizing the threaded hole that secures and clamps a lens in the conventional eyeglass frame. In this embodiment the universal adapter socket has a tongue with a hole for receiving a screw passing through the hole and threaded into the hole in the conventional eyeglass frame that secures and clamps the lens to the frame.

In an optional but less preferred embodiment, clips can provide additional support if desired. This, for example, might be used where very small magnets are used to attach the eyeglasses to the frames. In this embodiment a combination of the clip shown and described in applicant's prior Application Serial No. 08/510,797 filed August 3, 1995 or similar to that shown in the other patents can be attached to the auxiliary eyeglass frame. A clip would be incorporated into the bridge of the auxiliary eyeglass frame which would fit over and engage the conventional eyeglass

bridge. This would lock the auxiliary eyeglass frame on the conventional eyeglass frame with the magnets holding the sides in place.

In still another optional but less preferred embodiment, a magnet could be provided beneath the bridge of a conventional eyeglasses to mate with a similar magnet on top of the bridge of the auxiliary eyeglass frame. In this embodiment clips would be attached on top of or in the temple region of the auxiliary eyeglass frame that would fit over and engage the conventional eyeglass frame. In this embodiment the auxiliary eyeglass would be mounted by sliding the clips over the conventional eyeglass frame then pushing down on the bridge so that the magnet on the bridge slides under the bridge of the conventional eyeglass frame mating the magnets. The magnets in the bridge hold the auxiliary eyeglasses onto the frame of the conventional eyeglasses with the clips securely locking it in place.

The above and other novel features of the invention will be more fully understood from the following detailed description and the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an isometric view illustrating the method and apparatus for attaching an auxiliary eyeglass frame to conventional eyeglasses with magnets alone.

Figure 2 is an isometric view illustrating the auxiliary eyeglass frame attached to a conventional eyeglass frame with magnets alone.

Figure 3 illustrates the connection of the auxiliary eyeglass frame by magnets embedded in an appendage mating with similar magnets embedded in the temple extension of a conventional eyeglass frame.

Figure 4 illustrates an optional embodiment in which a clip formed on the bridge of the auxiliary eyeglass frame fits over and engages the bridge on the conventional eyeglass frame.

Figure 5 shows the embodiment of Figure 4 mounted on a conventional eyeglass frame.

Figure 6 is a sectional view taken at 6-6 of Figure 5.

Figure 7 is another embodiment in which magnets are embedded in the bridge of the auxiliary eyeglass frame for mating with magnets mounted beneath the bridge of a conventional eyeglass frame and including clips for locking the auxiliary eyeglass frame onto the conventional eyeglass frame.

Figure 8 illustrates the method of mounting the auxiliary eyeglass frame of Figure 7 on a conventional eyeglasses.

Figure 9 illustrates the embodiment of Figure 7 with the auxiliary eyeglass firmly secured on a conventional eyeglass frame.

Figure 10 is a sectional view taken at 10-10 of Figure 9.

Figure 11 is an isometric view of another alternate embodiment of the invention.

Figure 12 is an isometric view of the preferred

alternate embodiment illustrating the method of mounting the auxiliary sunglasses on the conventional eyeglass frame.

Figure 13 is a sectional view taken at 13-13 of Figure 11 illustrating the construction and arrangement in the preferred alternative embodiment.

Figure 14 is an isometric view of another optional embodiment of the invention with like reference numbers indicating like parts throughout.

Figure 15 is an isometric view of another optional embodiment illustrating the mounting of auxiliary eyeglasses on a conventional eyeglass frame.

Figure 16 is a sectional view taken at 16-16 of Figure 15.

Figure 17 is a sectional view similar to Figure 16 illustrating an alternative construction of a universal adapter socket.

Figure 18 is an isometric view of an optional configuration of the optional embodiment of the invention.

Figure 19 is an isometric view of the optional configuration of the optional embodiment illustrating the method of mounting auxiliary eyeglasses on the conventional eyeglass frame.

Figure 20 is a sectional view taken at 20-20 of Figure 19.

DETAILED DESCRIPTION OF THE INVENTION

A unique method and construction for attaching auxiliary eyeglasses 10 to conventional eyeglasses 12 is illustrated

in Figures 1 through 3. Auxiliary eyeglasses 10 are most commonly tinted eyeglasses to convert conventional eyeglasses 12 to sunglasses but also can have different prescription lenses. Auxiliary eyeglasses 10 has lenses 14 mounted in a frame 16 having appendages 18 extending rearward on either side of frame 16. Conventional eyeglasses 12 have a frame 20 with a bridge 22 with temple extensions 22 on either side of frame 20 for attaching temples 24 to the frames.

In the auxiliary eyeglasses of the prior art magnets are either embedded in frame 20 or in extension on auxiliary eyeglasses that extend over or above the temple extensions 22 of the eyeglass frame 20. With the prior art constructions of magnets embedded in frames 20 the plane of the magnets is vertical or parallel to the lenses facilitating detachment of the auxiliary eyeglasses by a downward shearing force. To solve this problem the auxiliary eyeglasses of U.S. Patent No. 5,568,207 proposed putting magnets in auxiliary eyeglass extensions that fit over or above the temple mounting extensions on the eyeglass frame. It was thought that some support in addition to the magnets was needed to prevent the auxiliary eyeglasses from becoming detached. While this is a satisfactory solution it is not the best solution. The auxiliary eyeglasses must be carefully positioned above the conventional eyeglass frame to be sure the extensions are above the temples.

The present invention not only provides a solution to the potential detachment or dislodging of auxiliary eyeglass

frames 10 but simplifies the method of mounting the auxiliary eyeglass with minimum fuss. This is achieved by inserting magnets 26 in sockets 28 in appendages 18 attached to auxiliary eyeglass frame 16. Complementary magnets 30 are mounted in sockets 32 attached to conventional eyeglass frame 20 temple extensions 22. Preferably magnets 26 and 30 are at least four millimeters (4 mm) in diameter.

An important and critical feature of the invention is the orientation of magnets 26 and 30, which is shown more clearly in sectional view of Figure 3. Generally magnets have plane surfaces and axis. In this case magnets 26 and 30 are shown as cylindrical having an axis 34 that is vertically oriented and is approximately parallel to auxiliary frame 16 and conventional eyeglass frame 20. This means the maximum magnetic attractive force is vertically oriented along axis 34. Accordingly the maximum magnet force of magnets 26 and 30 is vertically oriented to resist dislodging of auxiliary eyeglass frame 10 by a downward movement. It was found that by mounting magnets 26 and 30 approximately 4 mm in diameter having a strong magnetic force vertically oriented is sufficient to hold auxiliary eyeglass frame 10 in place and prevent downward movement. Thus, auxiliary eyeglass frame 10 is securely mounted on conventional eyeglasses 12 and will not easily dislodged by strenuous activity occurring in sports or exercising.

Shearing forces along interface 36 are minimal and would more likely cause conventional eyeglasses 12 to fall off the

wearer before auxiliary eyeglasses 10 would be dislodged. This construction not only improves the attachment of auxiliary eyeglasses 10 but also makes it easy for them to be mounted as illustrated in Figure 2. Auxiliary eyeglasses 10 can merely be brought up to conventional eyeglasses 12 with a slight upward motion until magnet 26 is attracted to magnet 30 and locks in place. Thus, they can easily be oriented and mounted on conventional eyeglasses 12 without the need to remove conventional eyeglasses from the wearer.

An optional but less preferred embodiment is illustrated in Figures 4 through 6. In this embodiment auxiliary eyeglasses 10' have appendages 18 with magnets 26 installed in sockets 28 as before. Magnets 26 mate with magnets 30 mounted in sockets 32 on conventional temple extensions 22 on conventional eyeglass frame 20 as before. However, to provide additional security and hold auxiliary frame 10' on conventional eyeglass frame 20, bridge 38 of auxiliary eyeglass frame 40 is formed with a clip 42 constructed to extend over and mount on conventional eyeglass bridge 44. Clip 42 will provide additional support for auxiliary eyeglasses 10' for use in extremely strenuous activity, for example, in cases where sports activities are such that conventional eyeglasses 12 are secured to the head of the wearer with straps that wrap around the back of the head. As shown in Figure 6 clip 42 formed on auxiliary eyeglass bridge 38 fits securely over bridge 44 on conventional eyeglass frame 20.

To mount the auxiliary eyeglasses 10' of Figure 4, they

are placed against the conventional eyeglasses 12 and slid gently upward until magnet 26 mates with magnet 30. Clip 42 formed in bridge 38 of auxiliary frame 40 is then slipped over a conventional eyeglass bridge 44 securely mounting eyeglasses 10' on conventional eyeglasses 12.

Another embodiment utilizing the combination of magnets and clips to securely mount auxiliary eyeglasses on conventional eyeglasses is illustrated in Figure 7 through 10. In this embodiment auxiliary eyeglasses 50 are formed with clips 52 mounted on the eyeglass frame 54 on the upper quadrant of the frame. Magnets 56 are secured in bridge 58 joining auxiliary eyeglass lenses 60. Conventional eyeglasses 62 are formed with frame 64 having a bridge 66 having complementary magnets 68 mounted in the bridge. In this embodiment auxiliary eyeglasses 50 are mounted on conventional eyeglasses 62 by the combination and opposing forces of clips 52 fitting over frame 70 of conventional eyeglasses 62 and bridge 58 fitting beneath bridge 66 so that magnets 56 in bridge 66 mate.

The installation of auxiliary eyeglasses 50 on conventional eyeglasses 62 is illustrated in Figures 8 and 9. Clips 52 on the upper quadrant of auxiliary lens frame 54 fit over conventional eyeglass frame 70 as shown in Figure 8. Auxiliary eyeglass bridge 58 is sufficiently flexible that bridge 58 can be pushed beneath bridge 66 on conventional eyeglass frame 62 allowing magnets 56 to mate with magnets 68 embedded in conventional eyeglass bridge 66.

Thus, auxiliary eyeglasses 50 are securely mounted on conventional eyeglasses 62 as illustrated in Figure 9 and held in place by the opposing forces of clips 52 and magnets 56 and 68. Again, this construction would perhaps be best where extremely strenuous activity is involved that requires conventional eyeglasses 62 to be secured on the head of the wearer with a strap.

Another alternate but preferred embodiment is illustrated in Figures 11 through 13. This embodiment improves the mounting of auxiliary eyeglasses 10' on conventional eyeglass frames 12' and also improves the aesthetic appearance. This embodiment improves the appearance of the magnets in the conventional eyeglass frame 12' by covering the exposed surface with a protective and decorative coating of material 72 configured to match the color and appearance of the conventional eyeglass frames 12'. Thus when auxiliary eyeglass frames 10' are removed from conventional eyeglass frames 12', the magnets in the sockets are not clearly visible. This is not possible with the arrangement in which the magnets mate above the conventional eyeglass frame 12'. When the auxiliary eyeglass frames 10' are removed the magnets would be visible.

A unique and important improvement is illustrated in Figures 12 and 13. In this embodiment a significant improvement has been achieved to assure secure attachment and alignment of auxiliary eyeglass frames 10' with conventional eyeglass frames 12'. To assure proper

alignment and secure attachment, magnets 26 in sockets 28 are extended or raised while magnets 30 in socket 32 are offset in recess 74. Thus when auxiliary frames 10' are pressed against conventional frames 12 with a gentle upward movement, alignment is insured by raised magnets 26 slipping into and seating in recess 74 in conventional eyeglass sockets 32 as shown in Figure 13. Magnet 26 in socket 28 are also covered with a protective and decorative coating material 72 to improve the aesthetic appearance and conceal the magnets.

Of course, either of sockets 28 or 30 could contain the recessed sockets while the other complementary socket could have the extended or raised magnet. The raised magnets 26 on the auxiliary eyeglass are merely shown to illustrate the construction and arrangement that improves alignment and provides a more secure attachment of auxiliary eyeglass frames 10' on primary or conventional eyeglass frames 12'. The lip or surface of recess 74 in socket 32 provides additional support for the auxiliary eyeglass frames to prevent the auxiliary eyeglass frames from moving in a horizontal direction. The construction and arrangement provides not only a secure and very efficient method of attaching auxiliary eyeglass frames 10' to main or conventional eyeglass frames 12' but provides automatic alignment and makes attachment much easier.

However, for most sports activities and exercising the construction disclosed and described with respect to Figures

1 through 3 is sufficient to mount auxiliary eyeglasses 10 on conventional frames 12. The key feature here is the orientation of magnets 26 and 30 so that the maximum magnetic attractive force along their axis (i.e. poles) 34 is vertically oriented or parallel with conventional eyeglass frame 20. In an optional but preferred embodiment the magnets form a recess in the sockets on either the auxiliary eyeglass frames or the conventional eyeglass frames while the magnets are slightly raised in the complementary sockets. This improves and assists in aligning the auxiliary eyeglass frames on the conventional eyeglass frames and also provides more secure attachment by hindering horizontal movement. In most cases only a substantial shearing force parallel to the interface 36 between magnets 26 and 30 could dislodge auxiliary eyeglasses 10 but then that force would probably dislodge conventional eyeglasses 12 from the head of the wearer.

All the embodiments previously described require specially constructed eyeglass frames to accommodate the auxiliary eyeglasses containing the magnets. That is, the conventional eyeglass frames have permanently mounted magnets as an integral part of temple extensions secured to conventional eyeglass frames. It would be advantageous if the system disclosed and described could be applied to existing conventional eyeglass frames. For that purpose, the embodiment illustrated in Figures 14 through 20 has been conceived.

This embodiment is similar to the embodiment illustrated

in Figures 11 through 13 because it employs the recessed socket to assist in alignment and retention of the auxiliary eyeglasses on the conventional eyeglass frame. Where this embodiment differs is the use of existing conventional eyeglass frame hardware for mounting the magnet. Thus the magnets can be attached to any existing conventional eyeglass frame.

As illustrated in Figure 14 conventional eyeglass frame 12 has a extension 22' for attachment of temples 24. Temple extensions 22' and temples 24 are attached to conventional eyeglass frame 12 with screws 88. This optional embodiment takes advantage of that mounting hardware.

This optional embodiment provides a universal adapter 80 comprised of a socket 82 having a tongue 84 with a screw hole 86 for receiving a screw 88. Universal adapter 80 is mounted on conventional eyeglass temple extension 22' by threading mounting screw 88 into hole 90. Universal adapter 80 thus allows a magnet to be attached to any conventional eyeglass frame as illustrated in Figures 15 through 17.

The construction and mounting of universal adapter 80 is illustrated more clearly shown in sectional views of Figures 16 and 17. Universal adapter 80 is comprised of a socket 82 for receiving magnet 92. Preferably socket 82 has a recess 94 for receiving raised magnet 26' in socket 28 attached to temple extension 18 on auxiliary eyeglass frames and 10'. Thus the universal adapter 80 disclosed allows auxiliary eyeglasses 10' to be attached to any existing conventional

eyeglass frame by simply attaching the universal adapter to the eyeglass frames with a screw 90 that also holds or secures conventional eyeglass temples 24.

An optional construction of universal adapter 80 is illustrated in Figure 17. This universal adapter 80' functions exactly the same except that it is comprised of a bar 96 forming tongue 84 secured to cylinder 98 by welding 100. A magnet 102 is seated in cylinder 98 providing a recess 104 for receiving magnets 26 mounted in socket 28 on temple extension 18 of auxiliary eyeglass frame 10'. Universal adapter 80' attaches to conventional eyeglass frame as before with screw 88 threaded into hole 90 for securing temples 24 to eyeglass frame 20.

Auxiliary eyeglass frame 10' is mounted as described previously and shown in Figure 15. Auxiliary eyeglass frame 10' is mounted from the bottom by an upward movement to seat magnets 26' in sockets 82 or 90 in universal adapter 80 or 80'. Recesses 94 or 104 securely hold auxiliary eyeglass frame 10' on conventional eyeglass frame 12.

Another optional configuration of the universal adapter 80 is illustrated in Figures 18 through 20. This configuration utilizes the existing hardware for mounting or clamping a lens 21 in frame 12. Lens 21 is mounted on conventional eyeglass frame 12 by clamping with screw 106 through flanges 108. In this embodiment since screw 106 threads into flanges 108 on conventional eyeglass 12 from the bottom, a modified or different universal adapter is required.

Modified universal adapter 110 is shown in greater detail in sectional view of Figure 20 taken at 20-20 of Figure 19. Universal adapter 110 is comprised of a cylinder 112 having a socket 114 for receiving a magnet 116.

To permit universal adapter 110 to be attached to the bottom of conventional eyeglass clamping flanges 108 by screw 106, tab 118 extends from the bottom periphery of cylinder 112 and has a hole 120 for receiving mounting screw 106. Note in this embodiment that magnet 26' in socket 122 provides a recess 124. Magnet 116 extends above the surface of cylinder 110 and seats in recess 124 of socket 122. This securely holds auxiliary eyeglasses 10' on conventional eyeglasses 12. Thus universal adapter 110 can be mounted below flange 108 with screw 106 that is used to clamp and hold lens 21 in conventional frame 12. The sectional view of Figure 20 illustrates that the magnet on the auxiliary eyeglass 10' can be recessed rather than the magnet on the conventional eyeglass frames or vice-a-versa as shown previously.

The mounting of auxiliary eyeglasses 10' on conventional eyeglass frames 12 is illustrated in Figures 18 and 19. Universal adapter 110 with integrally formed tab 118 is attached to conventional eyeglass frame 12 by threading screw 106 through hole 120 into flange 108 as illustrated in sectional view of Figure 20. For the universal adapter 110 mounted on each side of conventional eyeglass frame 12, auxiliary eyeglass 110 can then be fitted from beneath by

sliding auxiliary eyeglass frame up on conventional on eyeglass frame 12 until magnet 116 extending from cylinder 112 mates with magnet 26' on auxiliary eyeglass appendages 18.

Thus there has been disclosed novel and unique methods for attaching auxiliary eyeglass to conventional eyeglasses. In one embodiment, magnets having an orientation such that their maximum magnetic force is vertical or parallel with conventional eyeglass frame is sufficient to hold the auxiliary eyeglasses securely on the conventional eyeglasses.

Auxiliary eyeglasses 10' have appendages with cylindrical sockets for receiving magnets. Magnets are mounted on temple extension of conventional eyeglasses for receiving the auxiliary eyeglass frame appendages 18 that pass beneath the temple extensions of the conventional eyeglass. In another preferred variation, the magnets in one socket is recessed while in the other socket the magnet is extended to assist in alignment in holding the auxiliary eyeglass frame on the conventional eyeglass frame.

In still another embodiment of the invention, magnets are mounted in a universal adapter cylindrical sockets that can be mounted on conventional eyeglass frames utilizing existing hardware. In this embodiment, a magnet is mounted in a cylinder having a socket for receiving the magnet and a tongue having a hole for receiving a temple mounting screw. The cylindrical socket for receiving the magnet faces downward and is recessed for receiving an extended magnet

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/33513

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G02C 9/00, 7/08

US CL : 351/47, 57

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 351/47, 57,44

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

search terms: eyeglasses, spectacles, eyewear, goggles, magnet\$

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,568,207 A (CHAO) 22 October 1996 (22.10.96), see entire document.	1-15
A	US 5,940,162 A (WONG) 17 August 1999 (17.08.99), see entire document.	1-15
A	US 5,882,101 A (CHAO) 16 March 1999 (16.03.99), see entire document.	16-24

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

06 FEBRUARY 2001

Date of mailing of the international search report

APR 05 2001

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/33513

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack Unity of Invention because they are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for more than one species to be searched, the appropriate additional search fees must be paid. The species are as follows:

- A. Figs. 1,2.
- B. Figs. 14,15.

The claims are deemed to correspond to the species listed above in the following manner:

- A. Figs. 1,2, claims 1-15.
- B. Figs. 14,15, claims 16-24.

The following claims are generic: NONE

The species listed above do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: Two species A and B of claims 1-15 and 16-24 are not so linked to form a single inventive concept. The universal adapter of species B can use with the existing hardware of conventional eyeglasses in attaching auxiliary eyeglasses to the conventional eyeglasses while the socket of the species A have to form on the conventional eyeglasses before attaching the auxiliary eyeglasses.

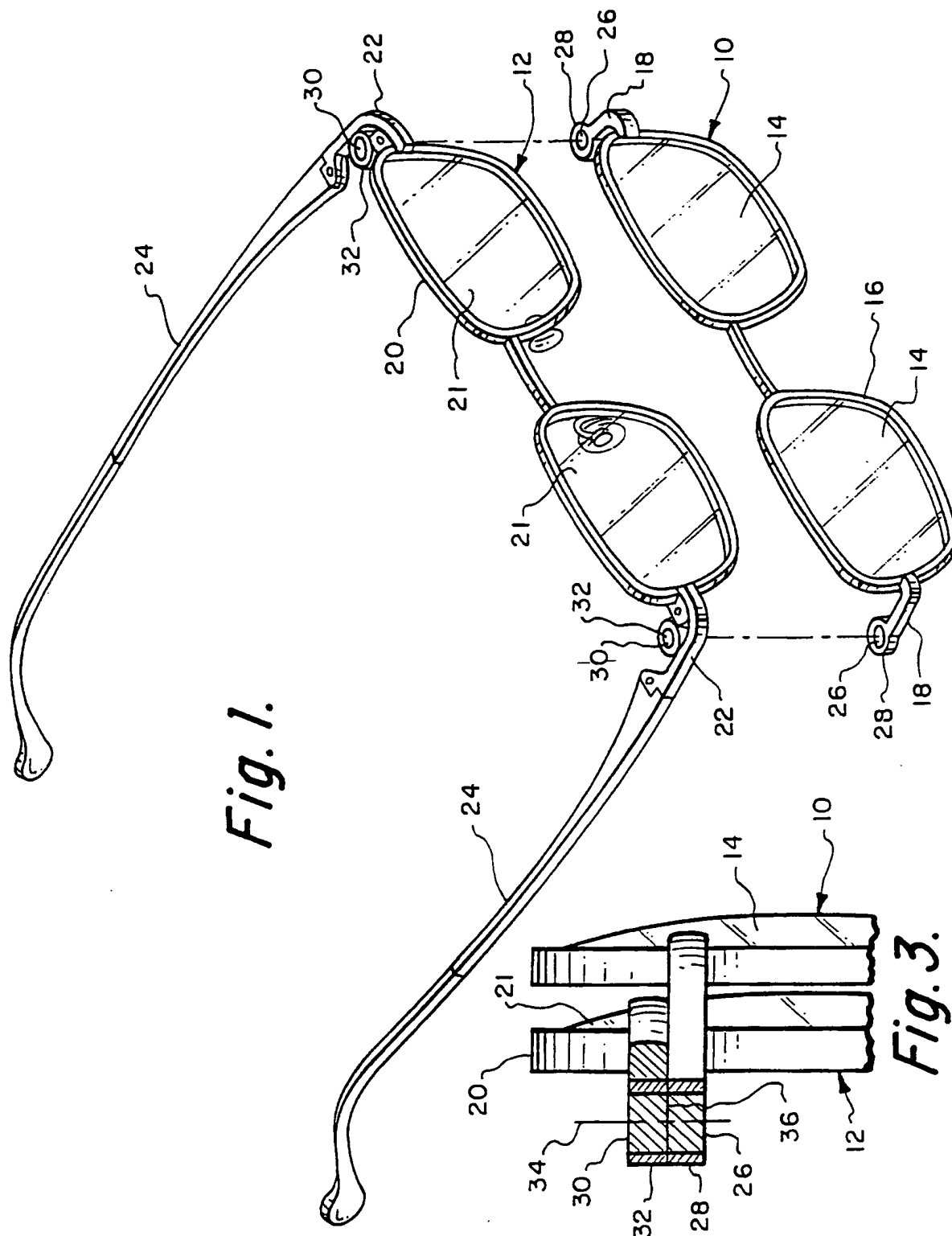
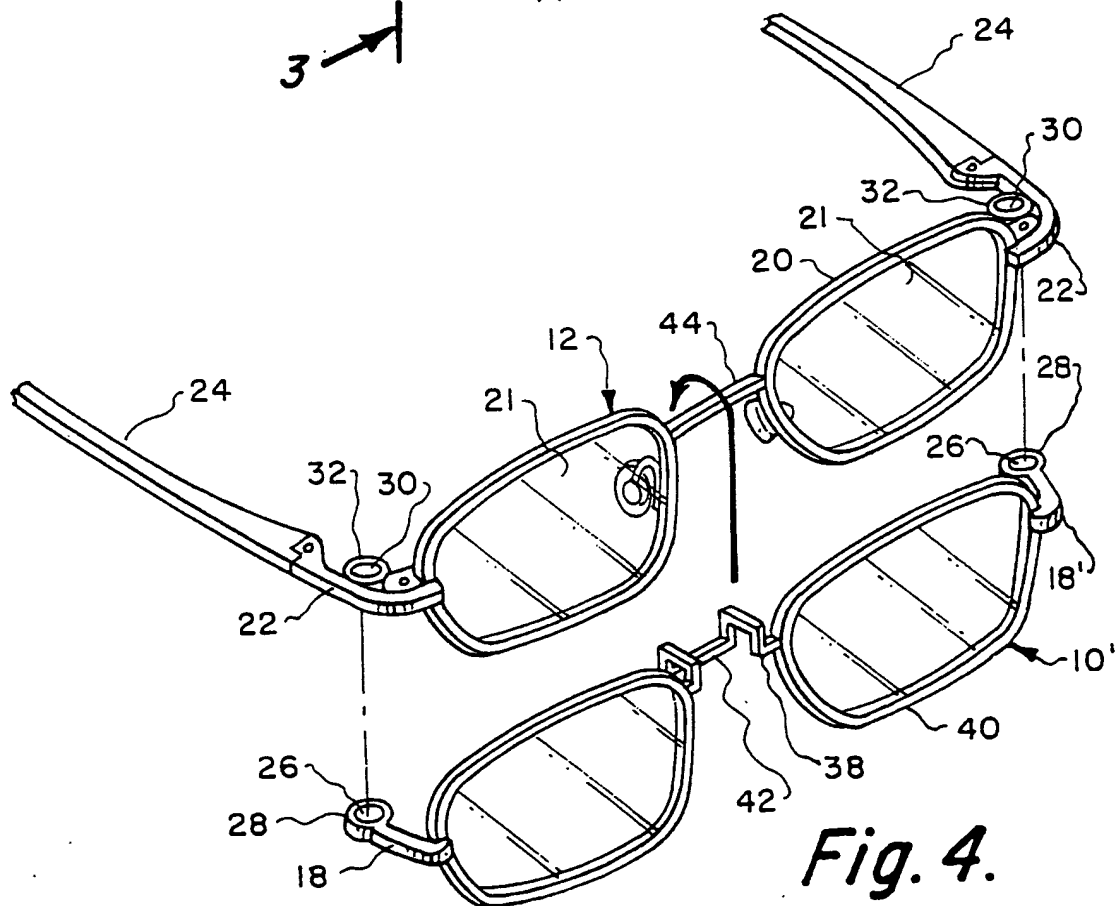
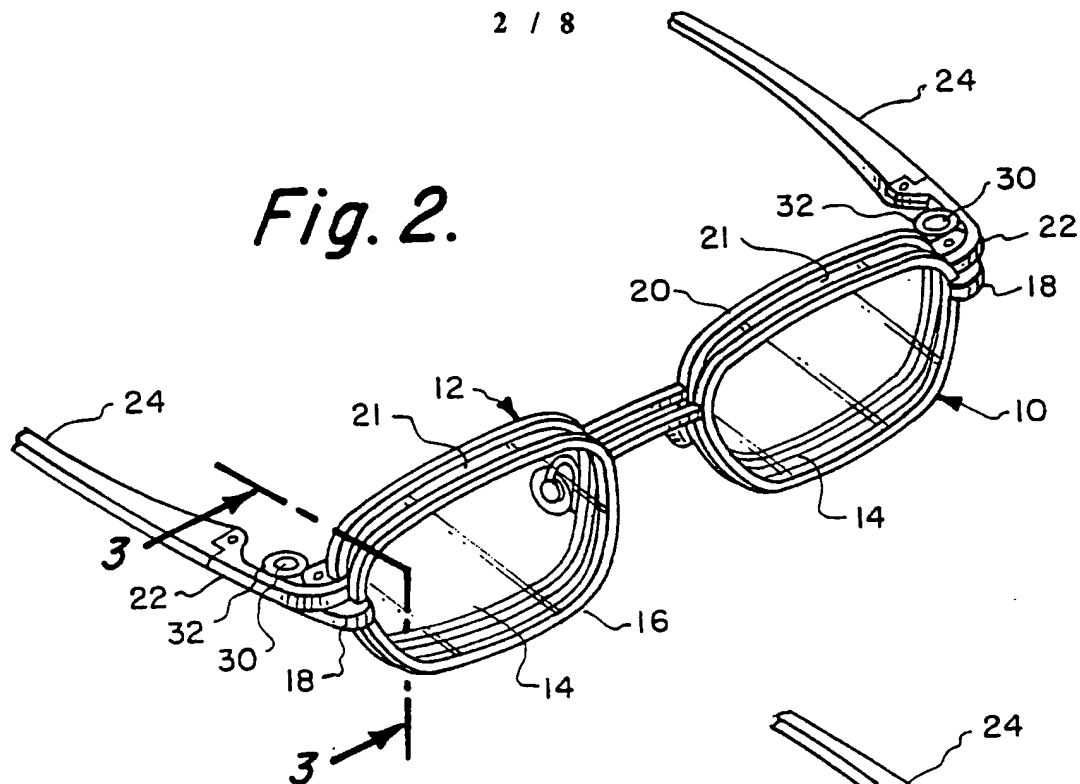


Fig. 1.

Fig. 3.

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Fig. 2.*Fig. 4.*

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Fig. 5.

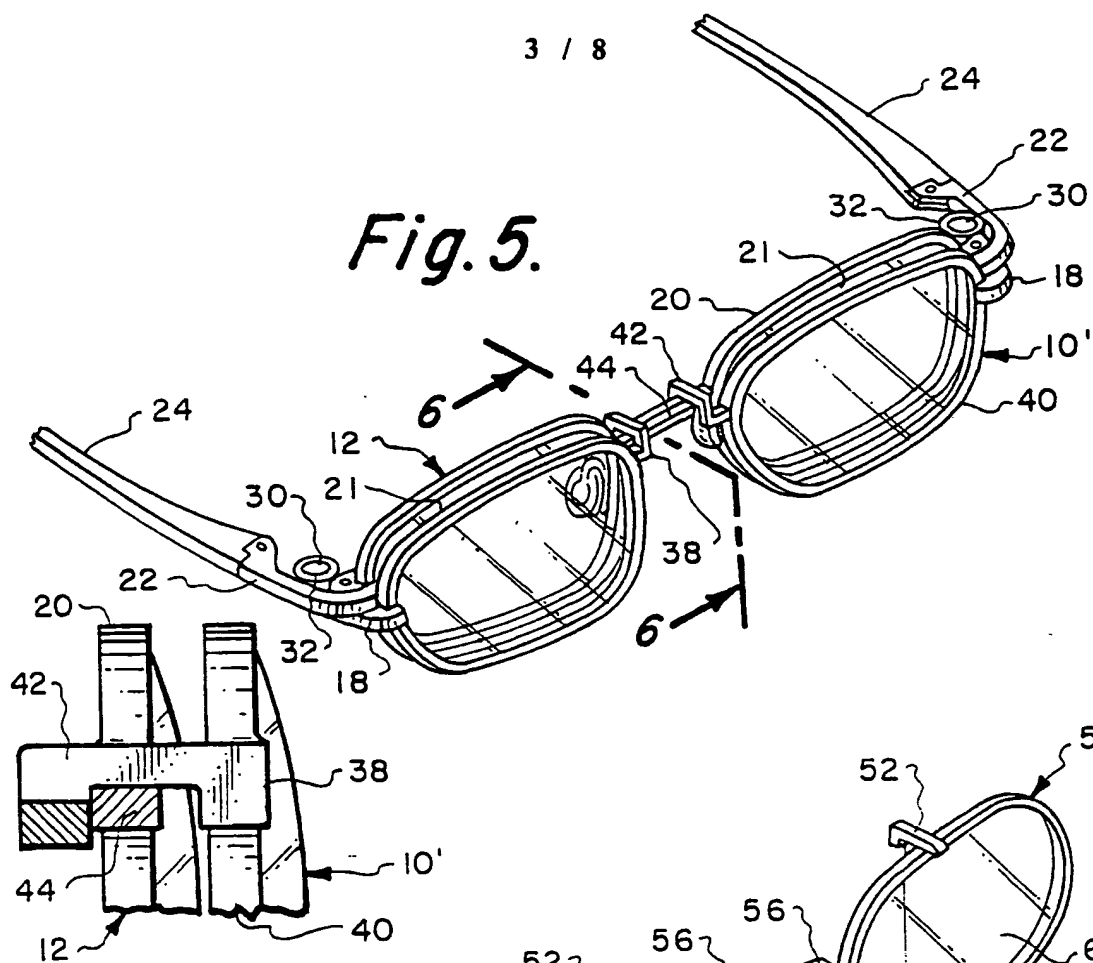


Fig. 6.

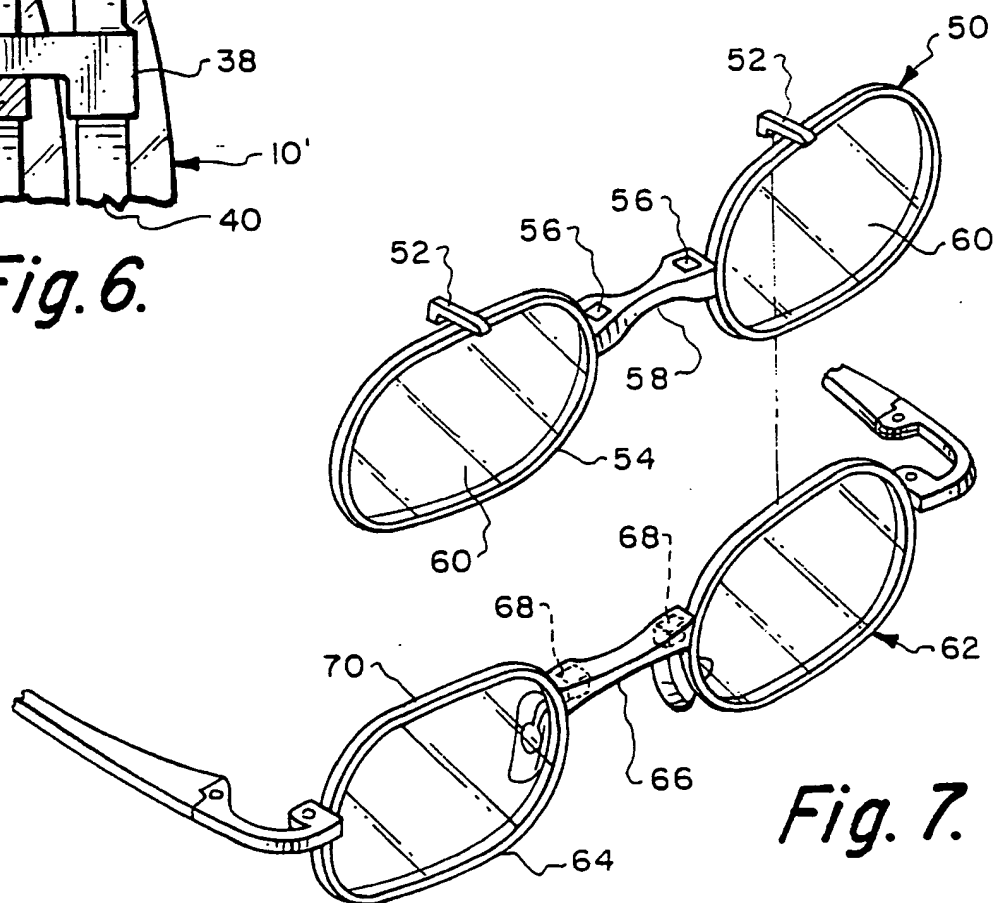


Fig. 7.

Fig. 8.

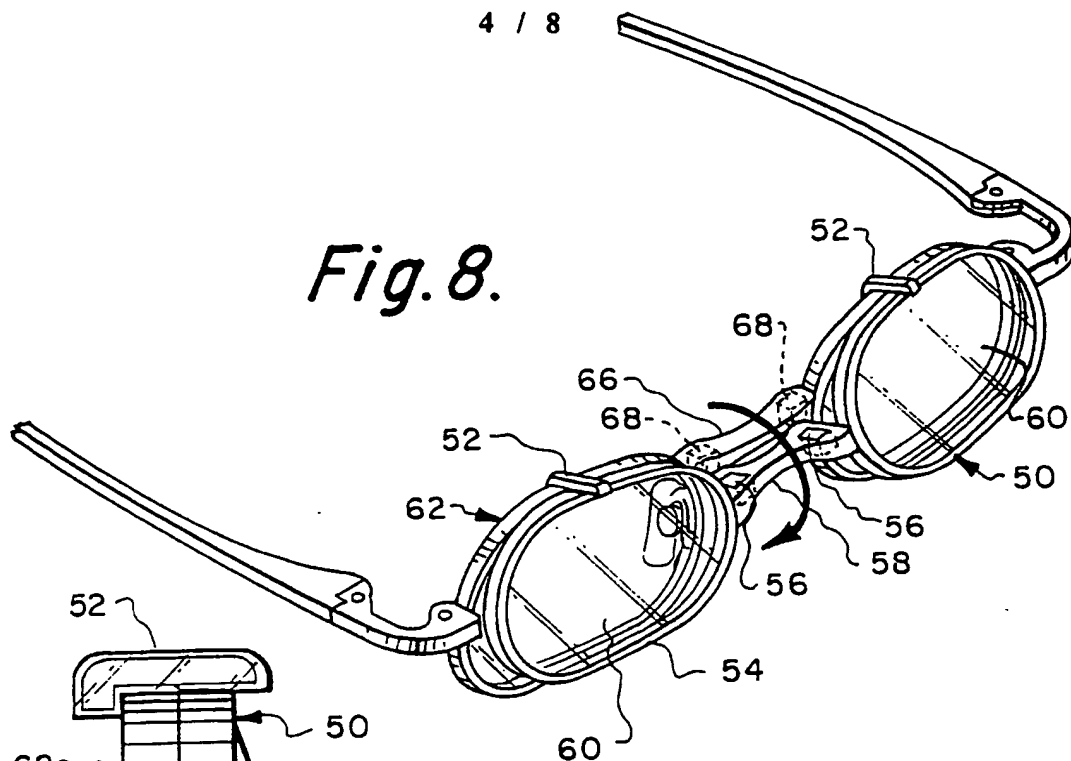


Fig. 10.

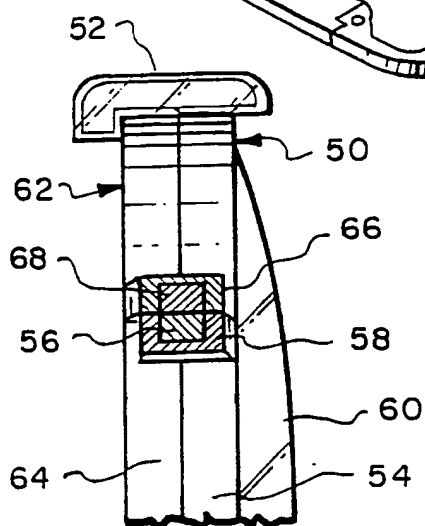
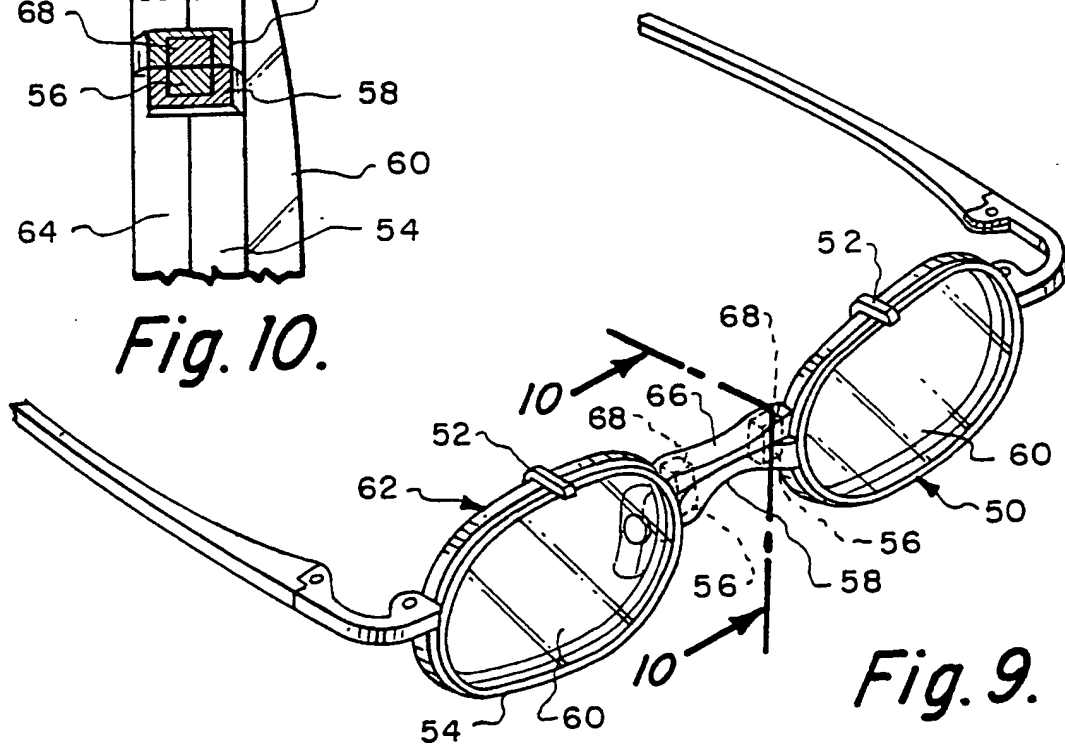
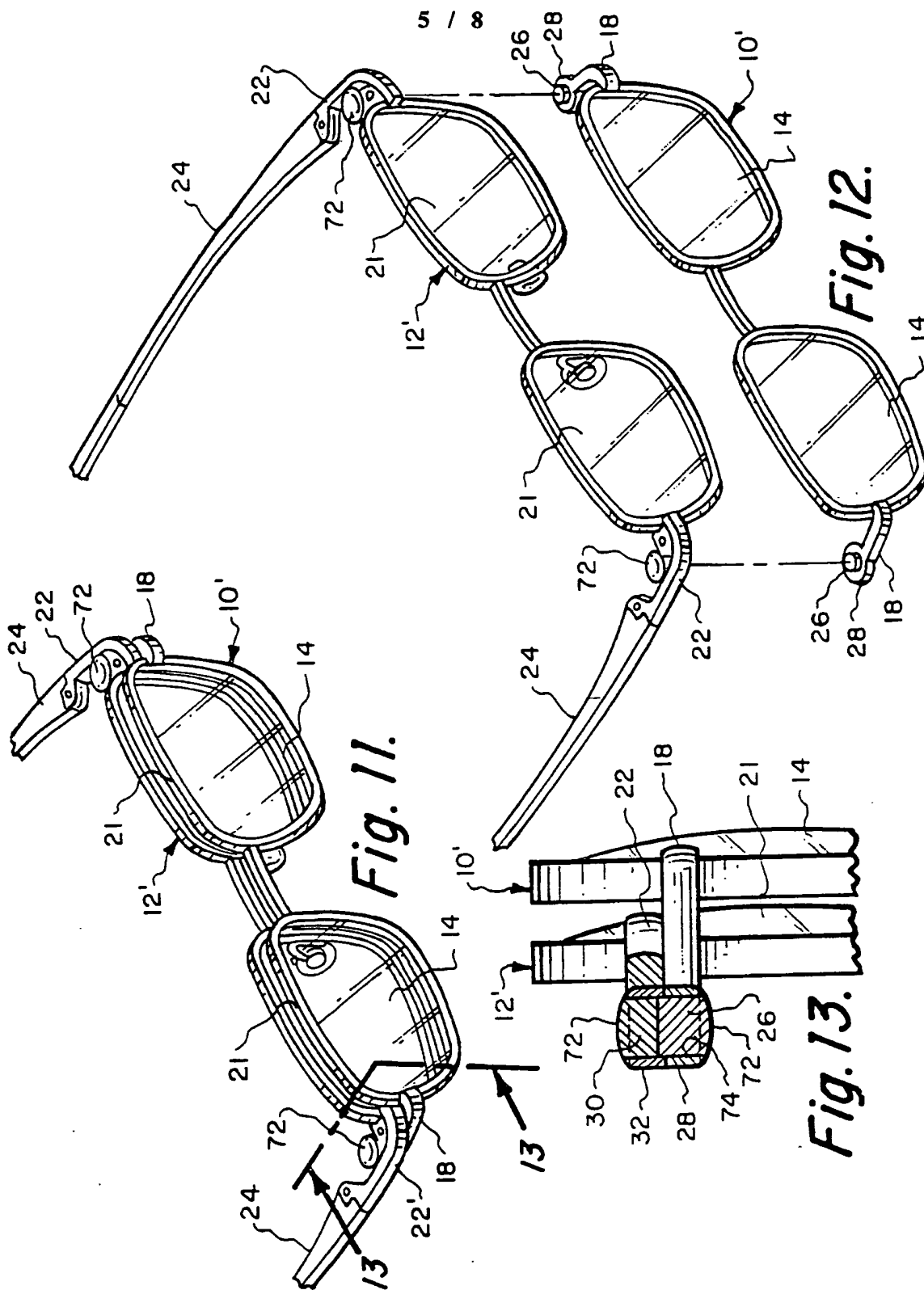


Fig. 9.



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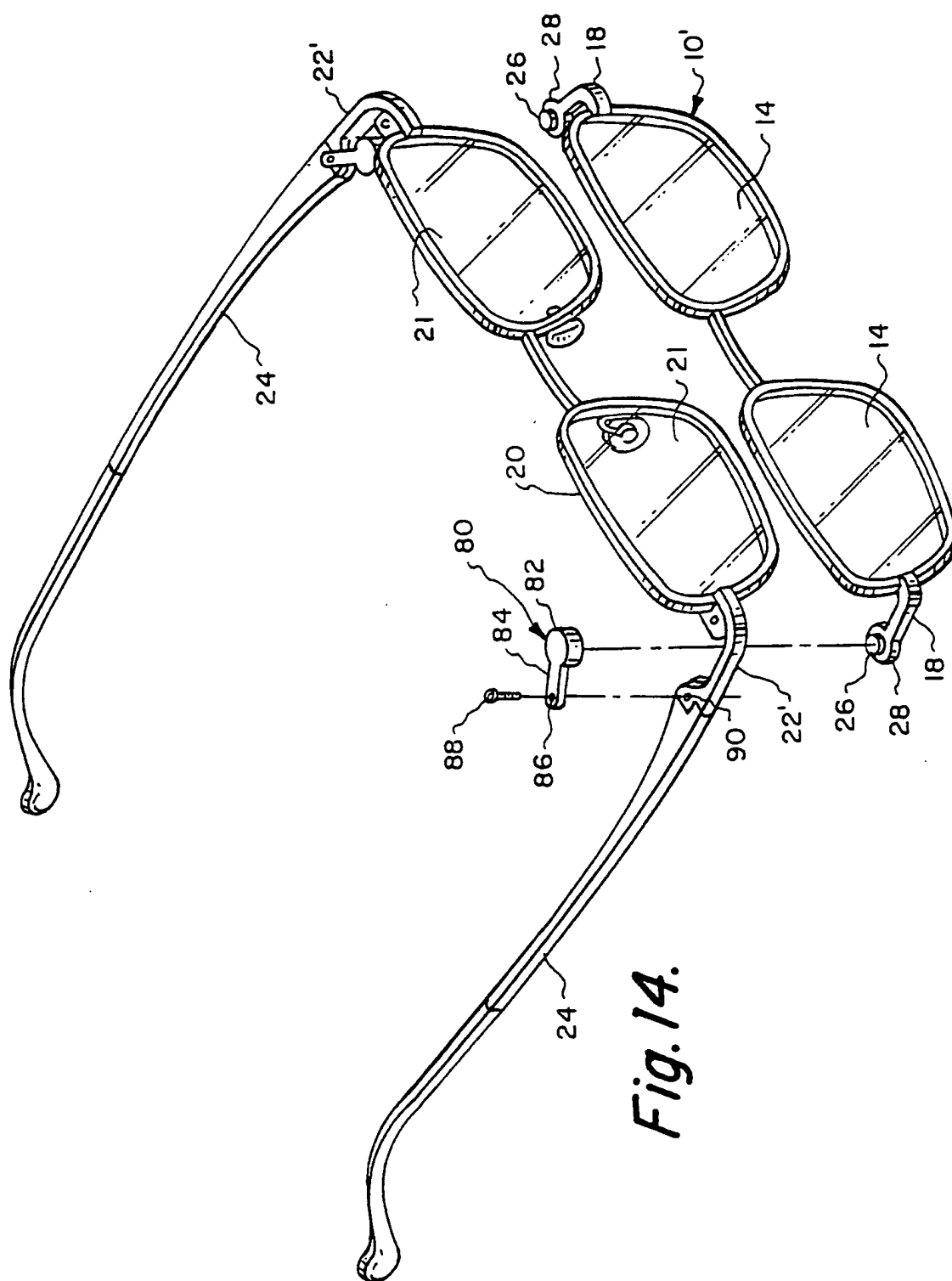
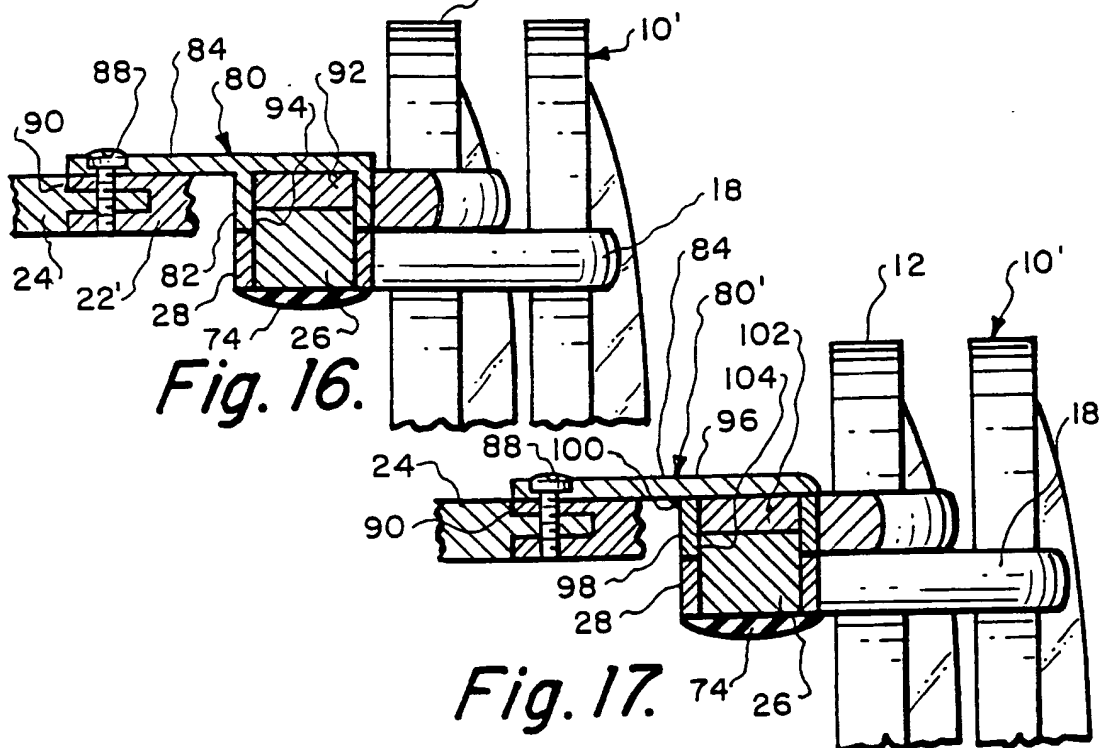
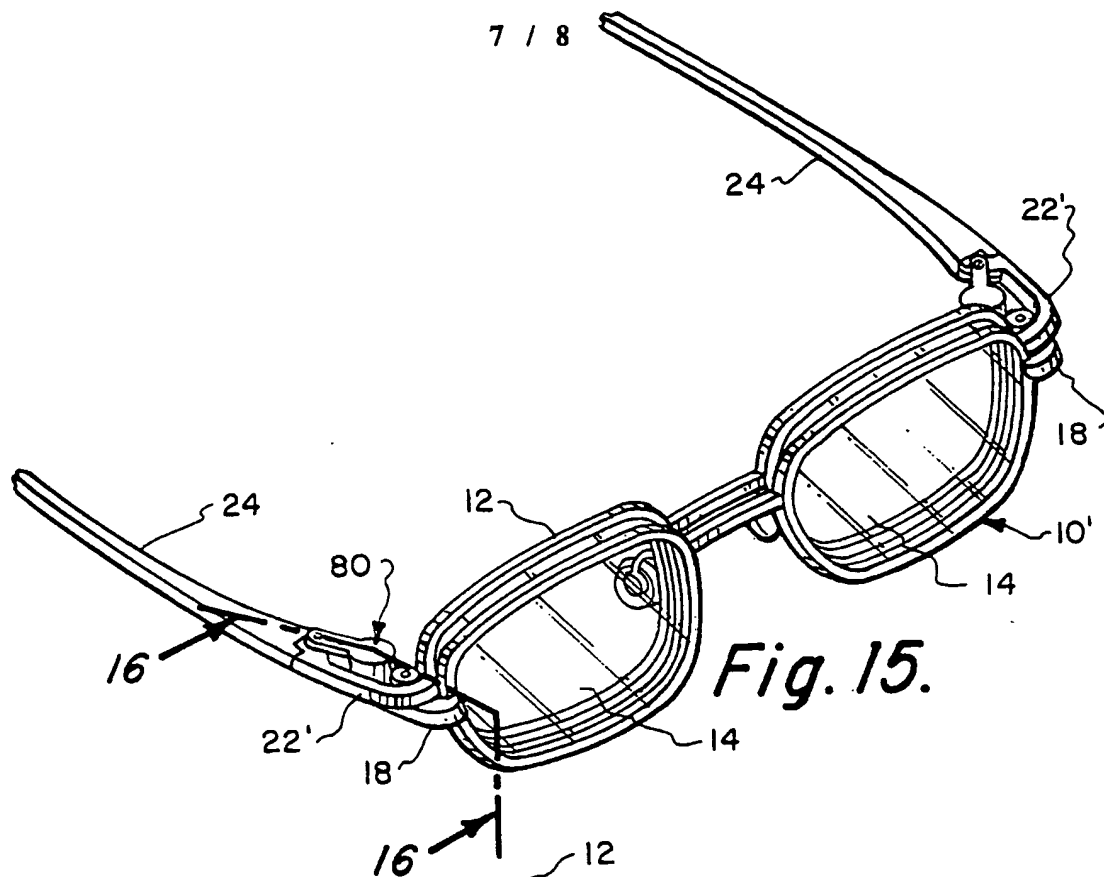


Fig. 14.



mounted on an appendages of auxiliary eyeglasses to seat in the recess in the universal adapter.

Another variation employs a universal adapter that attaches by using the screw for closing and clamping the conventional eyeglass frame around a lens. In this embodiment, a cylindrical socket is formed for receiving a magnet facing downward and is mounted beneath the flange for the lens clamping screw and has a tongue for securing the auxiliary universal adapter to the lens clamping flange.

In another less preferred embodiment a clip is attached to or integrally formed on the bridge of the auxiliary eyeglass frame for fitting over and securing the auxiliary eyeglasses to the bridge of the conventional eyeglasses.

In yet a third but less preferred embodiment a combination of clips and magnets are employed to mount auxiliary eyeglasses on conventional eyeglasses. In this third embodiment clips are formed in an upper quadrant on the frame of the auxiliary eyeglasses that fit over the frame of the conventional eyeglasses. Magnets embedded in the bridge of the conventional eyeglasses mate with magnets embedded in the bridge of the auxiliary eyeglasses such as the auxiliary eyeglass bridge fits beneath the conventional eyeglass bridge.

This invention is not to be limited by the embodiment shown in the drawings and described in the description which is given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

WHAT IS CLAIMED IS:

1. A method of attaching auxiliary eyeglasses to conventional eyeglasses comprising;

a plurality of magnets mounted in sockets on said conventional eyeglasses;

a plurality of magnets mounted in sockets on said auxiliary eyeglasses adapted to fit beneath and mate with said plurality of magnets on said conventional eyeglasses;

said plurality of magnets on said conventional eyeglasses and said plurality of magnets on said auxiliary eyeglasses being mounted to orient the magnetic attractive force vertically approximately parallel to the plane of lenses in said conventional eyeglasses;

said plurality of magnets being mounted in said sockets to form a recess on the conventional eyeglasses or auxiliary eyeglasses and mounted to extend from said sockets on the mating sockets;

whereby said auxiliary eyeglasses are prevented from moving downward and being displaced when mounted on said conventional eyeglasses by said attractive force between said magnets.

2. The method according to Claim 1 comprising mounting said plurality of magnets in said conventional eyeglasses in temple extensions of a frame of said conventional eyeglasses; and mounting said plurality of magnets on said auxiliary eyeglasses in appendages that extend from opposite sides of a frame of said auxiliary eyeglasses.

3. The method according to Claim 2 comprising mounting

a plurality of magnets with their axis vertically oriented parallel to the lenses of said conventional eyeglasses; and mounting a plurality of mating magnets with their axis vertically oriented parallel to the lenses of said auxiliary eyeglasses whereby the maximum magnetic attractive force prevents detachment of said auxiliary eyeglasses from said conventional eyeglasses by downward movement.

4. The method according to Claim 2 comprising; providing a pair of said sockets on said temple extensions and on said auxiliary eyeglass appendages; mounting said plurality of magnets in said respective sockets.

5. The method according to Claim 4 including forming a recess adjacent said plurality of magnets in said pair of sockets on said temple extensions; and extending said plurality magnets out of the other of said sockets on said auxiliary eyeglass appendages whereby said extended magnets fit into said recesses to automatically align and secure said auxiliary eyeglasses when mounted on said conventional eyeglass frame.

6. The method according to Claim 5 in which said sockets having said plurality of magnets on said conventional eyeglass frame extensions are recessed and said plurality magnets mounted on said appendages on said auxiliary eyeglass frame extend out of said sockets.

7. The method according to Claim 6 including; coating the exposed sides of said magnets with a protective and decorative material.

8. The method according to Claim 7 including coating the exposed sides of said magnets with a protective and decorative material that matches the frames of the conventional eyeglasses and auxiliary eyeglasses.

9. Apparatus for attaching auxiliary eyeglasses to conventional eyeglasses comprising;

a plurality of magnets mounted on said conventional eyeglasses;

a plurality of magnets mounted on said auxiliary eyeglasses for mating beneath said plurality of magnets on said conventional eyeglasses;

said plurality of magnets on said conventional eyeglasses and said mounting plurality of magnets on said auxiliary eyeglasses being oriented such that the maximum magnetic attractive force between said magnets is oriented vertically parallel to lenses in said conventional eyeglasses;

whereby said plurality of magnets on said auxiliary eyeglasses when mated beneath said plurality of magnets on said conventional eyeglasses provides maximum resistance to downward movement of said auxiliary eyeglasses thereby preventing said auxiliary eyeglasses from detaching from said conventional eyeglasses.

10. The apparatus according to Claim 9 in which said plurality of magnets mounted on said conventional eyeglasses are attached to temple mounting extensions on a frame of said conventional eyeglasses; and said plurality of magnets mounted on said auxiliary eyeglasses are mounted on

appendages on said auxiliary eyeglasses adapted to fit beneath said temple extension on said frame of said conventional eyeglasses.

11. The apparatus according to Claim 10 including sockets formed on said temple extensions and sockets formed on said appendages on said auxiliary eyeglasses; said plurality of magnets on said conventional eyeglasses and said auxiliary eyeglasses being mounted in said sockets.

12. The apparatus according to Claim 11 in which a first pair of said sockets having said plurality of magnets forming a recess; a second pair of sockets having a plurality of magnets that extend out of said sockets; said second plurality of magnets constructed to fit in said recesses in said first pair of sockets; whereby said second plurality of magnets automatically engage and fit into said recesses to automatically align and secure said auxiliary eyeglasses when mounted on said conventional eyeglasses.

13. The apparatus according to Claim 12 in which said first pair of sockets having said magnets forming a recess are on said conventional eyeglass extensions; and said second pair of sockets with magnets extended out therefrom are mounted on said auxiliary eyeglasses.

14. The apparatus according to Claim 10 including a protective and decorative coating on an exposed side of said plurality of magnets.

15. The apparatus according to Claim 14 in which said protective and decorative coating is constructed to match

the frames on said conventional eyeglasses and said auxiliary eyeglasses.

16. Apparatus for attaching auxiliary eyeglasses to conventional eyeglasses comprising;

a plurality of magnets mounted on said conventional eyeglasses;

a plurality of magnets mounted on said auxiliary eyeglasses for mating beneath said plurality of magnets on said conventional eyeglasses;

said plurality of magnets on said conventional eyeglasses and said mounting plurality of magnets on said auxiliary eyeglasses being oriented such that the maximum magnetic attractive force between said magnets is oriented vertically parallel to lenses in said conventional eyeglasses;

each of said plurality of magnets being mounted in a universal adapter constructed to be mounted on said conventional eyeglasses with existing hardware;

whereby said plurality of magnets on said auxiliary eyeglasses when mated beneath said plurality of magnets on said conventional eyeglasses provides maximum resistance to downward movement of said auxiliary eyeglasses thereby preventing said auxiliary eyeglasses from detaching from said conventional eyeglasses.

17. The apparatus according to Claim 16 in which said universal adapter comprises; a cylinder forming a socket; a magnet mounted in said socket; a tongue extending from said socket; a hole in said tongue for receiving a mounting screw

for attaching said universal adapter to said conventional eyeglasses.

18. The apparatus according to Claim 17 in which said tongue is integrally formed on said cylinder for receiving said magnet.

19. The apparatus according to Claim 18 in which said tongue is integrally formed on said cylinder for mounting with said screw to an existing mounting hole for attaching temples to said conventional eyeglasses.

20. The apparatus according to Claim 18 in which said tongue is integrally formed on said cylinder for mounting with said screw to existing holes in a flange for clamping a lens in said conventional eyeglass frame.

21. The apparatus according to Claim 17 in which said tab is welded to the end of said cylinder for receiving said magnet.

22. The apparatus according to Claim 21 in which said tab is welded on said cylinder for mounting with said screw to an existing mounting hole for attaching temples to said conventional eyeglass frame.

23. The apparatus according to Claim 17 in which each of said plurality magnets in said socket form a recess; each of said plurality magnets on said auxiliary eyeglasses are extended; whereby said extended magnets fit into said recess and mate with a respective magnet in said universal adapter.

24. The apparatus according to Claim 17 in which each of said magnets in said socket extend beyond an end of said

cylinder; each of said plurality of magnets on said auxiliary eyeglasses are mounted to form a recess; whereby said extended magnets fit into said recess and mate with a respective magnet on said auxiliary eyeglasses.

